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Longitudinal Risk Factors for Cyberbullying in Adolescence

Fabio Sticca, Sabrina Ruggieri, Françoise Alsaker, & Sonja Perren

Abstract

Cyberbullying has emerged as a new form of antisocial behavior in the context of online communication over the last decade. The present study investigates potential longitudinal risk factors for cyberbullying. A total of 835 Swiss seventh-graders participated in a short-term longitudinal study (two assessments six months apart). Students reported on the frequency of cyberbullying, traditional bullying, rule-breaking behavior, cybervictimization, traditional victimization, and frequency of online communication (interpersonal characteristics). In addition, we assessed moral disengagement, empathic concern, and global self-esteem (intrapersonal characteristics). Results showed that traditional bullying, rule-breaking behavior, and frequency of online communication are longitudinal risk factors for involvement in cyberbullying as a bully. Thus, cyberbullying is strongly linked to real world antisocial behaviors. Frequent online communication may be seen as an exposure factor that increases the likelihood of engaging in cyberbullying. In contrast, experiences of victimization and intrapersonal characteristics were not found to increase the longitudinal risk for cyberbullying over and above antisocial behavior and frequency of online communication. Implications of the findings for the prevention of cyberbullying are discussed.

Key words: cyberbullying, traditional bullying, victimization, longitudinal, risk factors.

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The rapid development of modern communication technologies over the last decade has led to a number of new possibilities of online interaction. Especially since smart phones conquered the market, an increasing number of people have mobile access to the Internet and may be online around the clock. In Switzerland, 95% of adolescents aged 12-19 years have Internet access at home, while 75% also have access to the Internet from their own room. Moreover, virtually every Swiss adolescent owns a mobile phone (Willemse, Waller, & Süss, 2010).

This evolution in communication technologies has also led to problematic patterns of interpersonal communication. One such problematic pattern is cyberbullying. Cyberbullying can be seen as a modern form of bullying, defined as an aggressive behavior that is intentionally (*hostile intent*) and repeatedly (*repetition*) carried out against a defenseless victim (*power imbalance*; Olweus, 1993). The modern element of cyberbullying is the use of electronic forms of communication (e.g., the internet or mobile phones; Smith, Mahdavi, Carvalho, Fisher, Russell, & Tippet, 2008). However, repetition and power imbalance are features of traditional bullying that may be hard to conceptualize in the context of cyberbullying (Dooley, Pyzalski, & Cross, 2009; Nocentini, Calmaestra, Schulze-Krumbholz, Scheithauer, Ortega, & Menesini, 2010; Vandebosch & Van Cleemput, 2009). In fact, repetition and power imbalance are sometimes omitted from the definition and operationalization of cyberbullying, making it hard to compare existing studies with each other (for review, see Tokunaga, 2010). Although cyberbullying may be seen as bullying by electronic means, there are some features that distinguish cyberbullying from traditional bullying: (1) the perception of perpetrators' anonymity, (2) the potentially infinite audience, (3) the bully's inability to observe the target's immediate reaction, and (4) the absence of time and space constraints (Slonje & Smith, 2008).

Over the last decade, cyberbullying has attracted much attention both in the media and in scientific research. This has been fostered by a number of suicide deaths that were motivated by severe experiences of cyberbullying (e.g., ABC News, 2007). Nonetheless, research on cyberbullying is as young as the phenomenon itself, and results obtained so far are quite

fragmented. According to Tokunaga (2010), current cyberbullying research suffers from several problems: (1) unresolved issues of definition and measurement of cyberbullying, (2) lack of theoretical background, (3) over-reliance on cross-sectional data, and (4) a tendency to take simplistic approaches. The present study aims to overcome some of these limitations by analyzing longitudinal data and by simultaneously investigating a range of interpersonal (e.g., traditional bullying) and intrapersonal (e.g., global self-esteem) characteristics as potential longitudinal risk factors for involvement in cyberbullying. Note that in the following the terms cyberbullying and traditional bullying are used to indicate *bully* status in cyberbullying and traditional bullying, respectively. Similarly, the terms cybervictimization and traditional victimization are used to indicate *victim* status in cyberbullying and traditional bullying, respectively.

Risk factors for cyberbullying

Current empirical findings on risk factors associated with cyberbullying have been obtained from cross-sectional studies (Sourander, Klomek, Ikonen, Lindroos, Luntamo, Koskelainen et al., 2010). As cross-sectional studies cannot distinguish cause and effect, we do not know which cross-sectional correlates of cyberbullying can be considered as longitudinal risk factors, i.e. as factors that increase the odds of engaging in cyberbullying in the future. The current study investigates longitudinal associations between cyberbullying and a number of potential risk factors. We included a range of variables found to be associated with cyberbullying and other forms of antisocial behavior (e.g., traditional bullying) in previous cross-sectional research. Interpersonal characteristics included antisocial behaviors (i.e., traditional bullying and rule-breaking behaviors), experiences of victimization (i.e., cybervictimization and traditional victimization), and frequency of online communication. Intrapersonal characteristics included gender, moral disengagement, empathic concern, and global self-esteem.

Traditional bullying. One of the most consistent findings in cyberbullying research is the significant overlap between involvement in cyberbullying and traditional bullying. Many cyberbullies are also traditional bullies (Smith & Slonje, 2010; Smith, 2011b). Accordingly,

cyberbullying may be seen as an additional way to attack people rather than as something conceptually different (Gradinger, Strohmeier, & Spiel, 2010; Raskauskas & Stoltz, 2007). In order to investigate specific risk factors for cyberbullying *over and above* traditional bullying (i.e., *pure* cyberbullying), it is crucial to take this empirical (and conceptual) overlap into account (i.e., control for concurrent traditional bullying).

Rule-breaking behavior. Another form of antisocial behavior found to be associated with cyberbullying is rule-breaking behavior: Ybarra and Mitchell (2004) found that cyberbullies display increased rule-breaking behaviors (e.g., damaging property, consumption of cigarettes/alcohol), thus pointing to the need to elucidate the longitudinal role of this potential risk factor.

Cybervictimization and traditional victimization. Cybervictimization has been found to be positively associated with cyberbullying (Bauman, 2009; Mitchell, Finkelhor, Wolak, Ybarra, & Turner, 2011), and Ybarra and Mitchell (2004) proposed that traditional victims would use cyberbullying as a way to retaliate. However, this result was not replicated in more recent studies (Slonje & Smith, 2008; Raskauskas & Stoltz, 2007, Vandebosch & Van Cleemput, 2009). Nonetheless, Law, Shapka, Hymel, Olson, and Waterhouse (2012) have suggested that in cyberbullying dynamics there are many adolescents who are both cyberbullies and cybervictims at the same time. The authors postulate that this may be due to the fact that there is less direct contact and that power imbalances are not as salient and influential in cyberspace as in the real world. Therefore, reacting in an aggressive manner to an experience of victimization may be more likely than in the real world.

Frequency of online communication. Risky Internet usage has been found to be a significant predictor of involvement in cyberbullying (Erdur-Baker, 2010). Furthermore, cyberbullies spend significantly more time online than their peers (Erdur-Baker, 2010), especially using instant messaging programs (Ybarra & Mitchell, 2004). Frequent online communication can thus be considered as a risk factor for cyberbullying in the sense of an exposure effect.

Gender. Although previous findings clearly show that boys engage in more physical, verbal, and relational bullying than girls (Olweus, 2010), results for gender differences in cyberbullying are mixed. Some studies report higher involvement of boys (e.g., Erdur-Barker, 2010; Slonje & Smith, 2008), while some find no significant differences (e.g., Smith et al., 2008; Patchin & Hinduja, 2006) and others find girls to be more involved than boys (Kowalski & Limber, 2007).

Moral disengagement. Previous research showed that moral disengagement is associated with antisocial behavior in children and adolescents (Yadava, Shamara, & Gandhi, 2001). Traditional bullies stress the positive outcomes of aggressive acts for the self by distorting the consequences and by ignoring the victim (Menesini, Sanchez, Fonzi, Ortega, Costabile, & Lo Feudo, 2003; Perren, Gutzwiller-Helfenfinger, Malti, & Hymel, 2011). These and other moral disengagement strategies were also found to be positively associated with cyberbullying (Pornari & Wood, 2010). However, Pornari and Wood (2010) argue that although moral disengagement is a correlate of both cyberbullying and traditional bullying, cyberbullying demands lower levels of moral disengagement because of its greater anonymity and because the victim's reactions are not directly observable. There are also studies indicating that moral disengagement may not be associated with cyberbullying at all, especially if traditional bullying is taken into account (Perren & Gutzwiller-Helfenfinger, 2011).

Empathic concern. There is strong evidence for a positive relation between antisocial behavior and low levels of empathy (Jolliffe & Farrington, 2004). However, only low affective empathy was found to be associated with bullying (Jolliffe & Farrington, 2011; Caravita, Di Blasio, & Salmivalli, 2009), while low cognitive empathy was not (Jolliffe & Farrington, 2011). These results indicate that bullies are able to understand the victim's emotions but they do not share them (Sutton, Smith, & Swettenham, 1999). In relation to cyberbullying it was shown that cyberbullying is associated with lower levels of both affective and cognitive empathy (Ang & Goh, 2010; Schultze-Krumbholz & Scheithauer, 2009) and also with lower levels of global empathy (Steffgen, König, Pfetsch, & Metzler, 2012).

Global self-esteem. The direction of the relation between self-esteem and bullying is not consistent for bullies. Positive, negative, and non-significant associations between traditional bullying and self-esteem have all been found (for review, see Patchin & Hinduja, 2010). For cyberbullying, the results of a cross-sectional study by Patchin and Hinduja (2010) revealed that cyberbullies report lower levels of self-esteem than non-involved students. In sum, the role of self-esteem as a longitudinal risk factor for cyberbullying has yet to be explored.

Research questions

The present study aims to move beyond the cross-sectional nature of the literature on cyberbullying (Tokunaga, 2010) and give an insight into the relative importance of different longitudinal risk factors for cyberbullying.

Based on the cross-sectional results presented above, we hypothesize that interpersonal characteristics (i.e., traditional bullying, rule-breaking behaviors, traditional victimization, cybervictimization, frequent online communication) and lower levels of empathic concern increase the odds of future involvement in cyberbullying. In addition, we will explore the role of gender, moral disengagement, and global self-esteem.

As there is a strong overlap between cyberbullying and traditional bullying (Smith, 2011a), it is necessary to account for concurrent traditional bullying in order to analyze which risk factors predict *changes* in cyberbullying, *over and above* concurrent traditional bullying. Accordingly, we will control for the effect of previous involvement in cyberbullying (i.e., consider residual changes in cyberbullying), and for the effect of concurrent involvement in traditional bullying.

Method

Procedure

Data from a longitudinal study carried out in Switzerland (netTEEN) will be presented in this paper. Data from the first (November/December 2010) and the second (May 2011) wave of data assessment are included. As required by Swiss legislation, permission to conduct the study was

obtained from the respective school councils. School directors and teachers from the selected schools volunteered, and parents were told about the study and asked to inform the teachers if they did not want their children to participate (passive consent). The parents of four adolescents refused to participate. The participants were informed about the survey's procedure and goal, and were given the opportunity to refrain from participation with no negative consequences (informed oral consent). Students who did not want to participate were offered another activity during the relevant school period.

An electronic self-report questionnaire was administered in classrooms on netbooks. For students who were absent during the classroom assessment a personal login and password were distributed. These students completed an online version of the questionnaire.

Sample

Three Swiss cantons (Wallis, Thurgau, Ticino) with integrative school systems were randomly selected from the 15 cantons with integrative school systems. In integrative school systems, students are not divided into higher and lower performance classrooms. By selecting only schools with integrative school systems we therefore avoided systematic effects from the academic performance level of the class. In each of the three cantons, four schools with at least three classrooms were randomly selected and each school was represented in the present study by three to four classrooms, resulting in a total of 43 classrooms. In the first assessment 835 Swiss adolescents (49% females, mean age = 13.2, SD = 0.64) participated in the study. A total of 820 students also participated in the second assessment. Attrition was mainly due to adolescents having moved schools.

Measures

Cyberbullying. A scale covering a set of different aggressive behaviors performed using electronic means was developed for this study. A detailed list of the items can be found in the appendix. The same items were used to assess both cyberbullying (six items; $\alpha = .62$) and cybervictimization (six items; $\alpha = .76$). Participants rated how often they had performed

(cyberbullying) and how often they had suffered (cybervictimization) these behaviors in the past four months. Possible responses ranged from one (*never*) to five (*almost daily*). Due to its high degree of skew at the upper end of the scale, cyberbullying was dichotomized. Those participants who scored higher than one on at least one of the cyberbullying items were classified as *cyberbullies*. Those participants who scored higher than one on at least one of the cybervictimization items were classified as *cybervictims*.

Traditional bullying. Involvement in traditional bullying as a bully or as a victim was assessed using an adapted version of a validated traditional bullying and victimization scale (Alsaker, 2003). This scale consists of twelve items encompassing a set of different aggressive behaviors (e.g., laughing at people, insulting, excluding or hitting someone). Six items were used to assess traditional bullying ($\alpha = .63$) and six items were used to assess traditional victimization ($\alpha = .76$). Participants were asked how often they had performed/suffered these behaviors in the past four months. Participants rated each item from one (*never*) to five (*almost daily*). To make the data comparable, we also dichotomized the traditional bullying and the traditional victimization scale used the same cut-off we used for cyberbullying (i.e., 1-2 times).

Rule-breaking behavior. Rule-breaking behavior was assessed using an eight-item scale specifically developed for this study. The items described a variety of rule breaking behaviors (e.g., destroying things, smoking, drinking, stealing or cheating during tests). Participants were asked to indicate how often they had performed these behaviors in the past four months. Participants rated each item from one (*never*) to five (*almost daily*). Item scores were averaged to gain an overall score of rule-breaking behavior ($\alpha = .75$), with higher scores indicating more rule-breaking behavior.

Frequency of online communication. Frequency of online communication was assessed using an eight-item scale specifically developed for this study. These eight items described a set of social online activities (e.g., phone calls, chatting). Participants were asked to indicate how often they had performed these activities in the past four months. Possible responses ranged from one (*never*) to

five (*almost daily*). Scores for the eight items were averaged to create an overall score of frequency of online communication (α = .80), with higher scores indicating more online communication.

Moral disengagement. Participants were given two hypothetical bullying scenarios describing an adolescent excluding and humiliating a peer, respectively. After each scenario the participants were given five (scenario one) and six (scenario two) statements (e.g., *That schoolmate deserved it*) and were asked if they agreed (Perren, Rumetsch, Gutzwiller-Helfenfinger, & Malti, 2012). Responses ranged from one (*not true*) to four (*true*). Scores were averaged to obtain a single score for moral disengagement (11 items, α = .86). Higher scores indicate higher levels of moral disengagement.

Empathic concern. A scale by Zhou, Valiente, and Eisenberg (2003), slightly adapted and translated into German (Malti, Gummerum, Keller, & Buchmann, 2009), was used to assess empathic concern. Participants were given five statements about empathic feelings for other people in difficult situations (e.g., *When I see other adolescents who feel bad, I empathize with them*). Participants rated the statements on a scale ranging from one (*not true*) to four (*true*). Item scores were averaged to gain a single score of empathic concern (α = .87), with higher scores indicating higher empathic concern.

Global self-esteem. An adapted German version of the Rosenberg-Scale (Collani & Herzberg, 2003) was used to assess global self-esteem. Participants rated ten statements about their global self-esteem (e.g., *All things considered, I am happy with myself*) on a scale ranging from one (*not true*) to four (*true*). A mean score of all ten items was calculated (α = .78). Higher means indicated higher global self-esteem.

Results

Descriptive results

Table 1 shows the frequencies of the dichotomized variables, and the means and standard deviations of all other variables. Note that the mean of a dichotomized variable with scores of 0 and 1 represents the percentage of cases with a score of 1 (e.g., the percentage of cyberbullies).

The results show that cyberbullying is less prevalent than traditional bullying. The same was found for cybervictimization and traditional victimization. A comparison of involvement in cyberbullying at t1 and at t2 showed that 79.2% of participants were not involved in cyberbullying at either assessment, while 6.9% were involved both at t1 and at t2, 7.3% were involved only at t1, and 6.7% were involved only at t2.

Bivariate associations

Correlations between all variables were calculated to gain a descriptive overview of all associations (table 1). Cyberbullying at t1 is positively associated with all other variables except gender (no significant association), and is negatively correlated with empathic concern and self-esteem. Cyberbullying at t2 is positively correlated with all variables except global self-esteem and gender (no significant association), and is negatively correlated with empathic concern.

- Place Table 1 about here –

Analysis strategy for multivariate associations

To investigate multivariate associations between potential risk factors and cyberbullying, a hierarchical approach consisting of one logistic regression with four models was adopted. Cyberbullying at t2 was used as a dependent variable. The order of inclusion of the independent variables was based on the strength of their bivariate association with involvement in cyberbullying at t2, while maintaining the division of interpersonal and intrapersonal characteristics. In addition, interpersonal characteristics were sequentially entered in three steps in order to look progressively at the role of antisocial behaviors, experiences of victimization, and frequency of online communication. In model one, traditional bullying and rule-breaking behavior were entered as independent variables (interpersonal characteristics). In model two, cybervictimization and traditional victimization were entered as interpersonal characteristics. In model three, frequency of online communication was entered as interpersonal characteristic. Finally, in model four, gender, moral disengagement, empathic concern, and global self-esteem were entered as intrapersonal

characteristics. In all models cyberbullying at t1 and traditional bullying at t2 were included as control variables.

Results of multivariate logistic regression analyses

Table 2 shows the results of longitudinal multivariate logistic regression analyses. Results from model one showed that, when controlling for cyberbullying at t1 and traditional bullying at t2, traditional bullying at t1 and rule-breaking behaviors at t1 independently increased the odds of engaging in cyberbullying at t2. Those adolescents who display antisocial behaviors at t1 are at increased risk of being involved in cyberbullying at t2.

When adding experiences of victimization to the model, neither cybervictimization, nor traditional victimization were found to significantly increase the odds of engaging in cyberbullying at t2 over and above the effects of antisocial behaviors, which were still statistically significant.

In model three, frequency of online communication was found to increase the odds of engaging in cyberbullying over and above antisocial behaviors, which again were statistically significant, and experiences of victimization, which were still not statistically significant. Therefore, the more time adolescents spend in online communication at t1, the higher the risk that they will engage in cyberbullying at t2.

Model four showed that none of the intrapersonal characteristics significantly increased the risk of engaging in cyberbullying at t2 over and above the effect of antisocial behaviors and online communication, which were statistically significant, and experiences of victimization, which were not statistically significant. These results show that intrapersonal characteristics do not independently increase the odds of engaging in cyberbullying in the future, when interpersonal characteristics are taken into account.

In all models, both cyberbullying at t1 and traditional bullying at t2 were significant at the $p < .001$ level.

- Place Table 2 about here -

Discussion

The present study investigated the role of interpersonal and intrapersonal characteristics as longitudinal risk factors for cyberbullying. The results showed that the individual tendency to engage in different forms of antisocial behavior (traditional bullying and rule-breaking behavior) is the most important risk factor for cyberbullying, followed by the frequency of online communication.

Before the main results are discussed, it is worth taking a closer look at the prevalence of cyberbullying and traditional bullying.

Prevalence of cyberbullying

Cyberbullying was markedly less prevalent than traditional bullying at both the first and the second assessment. Furthermore, cybervictimization was found to be less prevalent than traditional victimization. These results confirm findings from previous studies (e.g., Juvonen & Gross, 2008; Li, 2007, Smith et al., 2008) and show that the picture of cyberbullying as a highly prevalent and steadily increasing problem is oversimplified. A possible reason for the difference in prevalence may be that adolescents spend most of their time directly interacting with their peers in the real world (e.g., school, after-school activities). In real world social interactions, traditional forms of bullying may be more likely to be performed than cyberbullying because a target may be directly available (e.g., is physically present) or because the social situation may be such that traditional forms of bullying are a more spontaneous response (e.g., writing an SMS would require more effort). In addition to this possible explanation, differences between the scales used to assess cyberbullying and traditional bullying may also have influenced their apparent prevalence: the cyberbullying scale contains relatively similar items (e.g., sending nasty messages to individuals or groups of individuals), while the traditional bullying scale contains more differentiated items (e.g., hitting someone, excluding someone) that may be performed in cyberspace as well. Nevertheless, the cyberbullying scale we used in this study encompasses all major types of cyberbullying that are

perceived as relevant at age 13: aggressive texting or messaging and sending problematic content in form of pictures or videos (Law et al., 2012, Smith et al., 2008).

Risk factors for engagement in cyberbullying as a bully

As hypothesized, bivariate analyses indicate that most of the potential risk factors show significant associations with cyberbullying. However, when controlling for past cyberbullying and concurrent traditional bullying, longitudinal analyses yielded a different picture: antisocial behaviors (traditional bullying and rule-breaking behaviors) and frequent online communication are longitudinal risk factors for cyberbullying, whereas neither experiences of victimization nor intrapersonal characteristics increase the odds of engaging in cyberbullying over and above antisocial behaviors and frequency of online communication.

Traditional bullies are at increased risk of engaging in cyberbullying in the future: those who attack others in the real world today are more than four times as likely to do so in cyberspace a few months later. Another significant longitudinal risk factor for involvement in cyberbullying was found to be rule-breaking behavior. Adolescents displaying behaviors such as smoking, drinking alcohol, hurting animals, or destroying others' property have twice the risk of getting involved in cyberbullying a few months later. This result adds a longitudinal perspective to the cross-sectional findings of Ybarra and Mitchell (2004), who reported that cyberbullies display more rule-breaking behaviors. Taken together, these findings suggest that adolescents who display some form of antisocial behavior in real world are at increased risk of involvement in cyberbullying. These results confirm our hypotheses and show that cyberbullying may be seen as an additional way of attacking people rather than something conceptually different (Gradinger et al., 2010, Raskauskas & Stoltz, 2007).

In addition to antisocial behaviors, frequency of online communication is another central risk factor for cyberbullying. As hypothesized, the more time adolescents spend communicating online, the higher their risk of engaging in cyberbullying. Moreover, online communication also increases the risk of cybervictimization (Juvonen & Gross, 2008). Therefore, the role of online

communication may be seen as an exposure effect that might be strongest for adolescents who have the possibility of communicating online from their own room (Law, Shapka, & Olson, 2010) or from mobile devices.

In contrast to the significant longitudinal role of antisocial behaviors and frequency of online communication, we found that experiences of victimization and intrapersonal characteristics did not increase the odds of engaging in cyberbullying in the future over and above antisocial behaviors and frequency of online communication. Moreover, neither gender nor global self-esteem were found to be associated with cyberbullying at t2 on a bivariate level. However, global self-esteem was found to be negatively associated with cyberbullying at t1. Our results therefore support those of Smith et al. (2008), and Patchin and Hinduja (2006), who also found no significant association between cyberbullying and gender, and are partly in line with those of Patchin and Hinduja (2010) who found that cyberbullies had lower levels of self-esteem. Although experiences of victimization and intrapersonal characteristics were not found to be risk factors for future involvement in cyberbullying as a bully, significant bivariate associations with cyberbullying at t1 and t2 were found for experiences of victimization, moral disengagement, and empathic concern. These variables might play a more central role as risk factors for other forms of bullying (e.g., traditional bullying; Stassen Berger, 2007). However, they have no direct link with changes in cyberbullying behaviors. The bivariate association between cyberbullying and experiences of victimization, moral disengagement and empathic concern might be mediated by antisocial behaviors: those who experienced victimization, who have high moral disengagement scores, or who lack empathic concern may be more prone to traditional forms of antisocial behaviors and, therefore, be inclined to cyberbullying in an indirect way.

It is important to note that the inclusion of cyberbullying at t1 and traditional bullying at t2 and all other predictors means that experiences of victimization, and intrapersonal characteristics have no predictive value for *changes* in *pure* cyberbullying, when all other predictors are taken into account. In sum, the present data suggest that involvement in cyberbullying does not directly depend on experiences of victimization or intrapersonal characteristics, but on the individual

tendency to engage in antisocial behaviors, including past acts of cyberbullying, and on the frequency of online communication.

In the light of these findings, some conclusions about the prevention of cyberbullying can be drawn. Given that traditional bullying is the strongest longitudinal risk factor for cyberbullying, prevention programs against traditional bullying may indirectly target cyberbullying too (Salmivalli, Kärnä, & Poskiparta, 2011). Examples of such intervention programs are the *Olweus Bullying Prevention Program* (Olweus, 1991), which inspired most anti-bullying programs developed over the last 20 years (for review see Farrington & Ttofi, 2009), and the *KiVa Antibullying Program* (Salmivalli, Kärnä, & Poskiparta, 2010), which focuses on the role of bystander behavior in the effective prevention of bullying. The general prevention of antisocial behaviors also plays a key role in preventing cyberbullying. A number of programs combating antisocial behaviors, such as *The First Step* program (Walker, Kavanagh, Stiller, Golloy, Severson, & Feil, 1998) or *The Incredible Years* program (Reid, Webster-Stratton, & Hammond, 2007), have been developed over the last decades. A central element of these programs is the development of social skills and competences and positive interpersonal relationships, to support social and school adjustment (Mcloughlin, 2009).

Finally, our results suggest that reducing the frequency of online communication also reduces the risk of engaging in cyberbullying. While this is a logical conclusion, it is important to note that electronic forms of communication are just tools and not in themselves the causes of problematic behaviors (Juvonen & Gross, 2008). Therefore the focus should be on the prevention of specific risk factors and on the promotion of safety on the Internet rather than on the frequency of online communication per se. Education in cybersafety strategies might help to reduce a variety of risky behaviors, such as publishing private content or giving away passwords. A comprehensive list of online risks and respective cybersafety strategies (e.g., raising awareness, targeting young users, creating industry support for internet safety) was proposed by Livingstone, Haddon, Görzig, and Ólafsson (2011).

Since cyberbullying is related to other group dynamics (e.g., traditional bullying) and aggressive behaviors emerge early in childhood (Monks, 2011), there is a need for comprehensive programs that are able to target different antisocial behaviors (Bostic & Brunt, 2011) starting as early as preschool (Monks, 2011). Furthermore, preventive efforts need to involve and to actively support both the school and the parents in their efforts to deliver the prevention program (Smith, 2011b).

Strengths and limitations

This study considered a set of potential risk factors for involvement in cyberbullying, elucidating their independent roles. The simultaneous inclusion of traditional bullying, rule-breaking behaviors, traditional victimization, and cybervictimization as potential risk factors for cyberbullying, led to very differentiated results. Furthermore, the use of a longitudinal design enabled us to shed light on the direction of causal effects.

There are, however, some limitations to the present findings that need to be borne in mind. First, the exclusive use of self-reports may have led to underreporting of antisocial behaviors, thereby compromising the validity of the information (Brown & Zimmermann, 2004). Second, the scales of cyberbullying, cybervictimization, traditional bullying, and traditional victimization show low to moderate internal consistencies. This reflects the fact that most adolescents show/suffer only one or two behaviors listed in the respective scales and, therefore, the internal consistencies cannot be expected to be high. A third limitation is that some important potential risk factors could not be included in our study (e.g., intelligence, personality, socioeconomic status, social context; Welsh & Farrington, 2007). These elements would give a more detailed picture of the characteristics that contribute independently to the development of cyberbullying. Last but not least, the time interval of six months between assessments is very short.

Conclusion

Taken together, these findings show that interpersonal characteristics such as antisocial behaviors and frequent online communication are the most prominent longitudinal risk factors for involvement in cyberbullying. The results also show that it is necessary to take a broad view of the phenomenon of cyberbullying. Models that do not include aggressive and antisocial behaviors may overestimate the independent role of certain characteristics as risk factors. Our results and those of other studies (Gradinger et al., 2010; Juvonen & Gross, 2008) suggest that cyberbullying can be seen as an online version of other real world antisocial behaviors, and so prevention of cyberbullying should focus on early prevention of different forms of antisocial behavior.

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Table 1: Bivariate correlations between all study variables (Pearson's r and Cranmer's V).

	M[b]	SD	1	2	3	4	5	6	7	8	9	10	11	12
1 Cyberbullying t1[a]	14%		1	.43***	.30***	.28***	.17***	.39***	.27***	.21***	-.13***	-.12***	.24***	.01
2 Cyberbullying t2[a]	13%			1	.28***	.32***	.13***	.22***	.30***	.20***	-.03	-.12***	.24***	-.05
3 Traditional bullying t1[a]	57%				1	.38***	.35***	.16***	.27***	.11**	-.06	-.14***	.31***	-.08
4 Traditional bullying t2[a]	47%					1	.19***	.12***	.25***	.16***	-.04	-.10***	.32***	-.07*
5 Traditional victimization t1[a]	69%						1	.27***	.14***	-.01	-.18***	-.01	.05	-.04
6 Cyber victimization t1[a]	22%							1	.20***	.16***	-.22***	-.06	.12***	.09**
7 Rule-breaking behavior	1.23	0.36							1	.30***	-.06*	-.18***	.36***	-.12***
8 Online communication	3.02	0.99								1	.00	-.05	.22***	.07
9 Global self-esteem	1.81	0.54									1	.05	.04	-.10**
10 Empathic concern	2.05	0.78										1	-.35***	.33*
11 Moral disengagement	1.68	0.57											1	-.22***
12 Gender (female)[a]	49%													1

Note. *p<.05; **p<.01; ***p<.001; [a] Cranmer's V was used to compute correlations between dichotomous variables, [b] the mean score of a dichotomous variable with scores of 0 and 1 represents the percentage of cases with a score of 1.

Table 2: Summary of logistic regression analyses

	Model 1		Model 2		Model 3		Model 4	
	OR	*95% CI*	*OR*	*95% CI*	*OR*	*95% CI*	*OR*	*95% CI*
Interpersonal characteristics								
Traditional bullying t1	4.06***	1.85-8.95	3.95***	1.75-8.90	4.05***	1.80-9.13	4.25***	1.79-10.08
Rule-breaking behaviors t1	2.85***	1.63-4.99	2.76***	1.58-4.80	2.38**	1.34-4.21	2.16*	1.18-3.97
Cyber victimization t1			1.59	0.90-2.78	1.50	0.85-2.64	1.63	0.91-2.91
Traditional victimization t1			1.06	0.53-2.12	1.16	0.58-2.33	1.41	0.67-2.94
Online communication t1					1.37*	1.04-1.79	1.43*	1.08-1.89
Intrapersonal characteristics								
Sex (female)							0.81	0.46-1.42
Moral disengagement t1							1.13	0.71-0.84
Empathic concern t1							0.92	0.64-1.32
Global self-esteem t1							1.23	0.79-2.04
Control variables								
Cyberbullying t1	5.19***	3.10-8.70	4.30***	2.47-7.49	3.93***	2.24-6.88	4.02***	2.26-7.14
Traditional bullying t2	4.76***	2.50-9.08	5.02***	2.62-9.64	4.97***	2.59-9.56	4.93***	2.49-9.73
N	794		792		792		767	
-2 Log-Likelihood	432.60		429.68		424.53		404.65	
Nagelkerke R^2	.388		.393		.403		.421	

Note. *p<.05, **p<.01, ***p<.001

Appendix

Cyberbullying scale

How often did you do the following things since the beginning of the school year?

	never	1-2 times	1x/month	1x/week	Almost daily	No response
Have you sent mean or threatening messages to anyone (text messages, MSN, Facebook, etc.)	☐	☐	☐	☐	☐	☐
Have you sent mean or threatening pictures or videos to anyone (picture messages, Facebook, etc.)?	☐	☐	☐	☐	☐	☐
Have you sent mean or embarrassing messages or spread rumours about anyone to your friends (text messages, MSN, Facebook, etc.)?	☐	☐	☐	☐	☐	☐
Have you sent mean or embarrassing pictures or videos of anyone to your friends (picture messages, Facebook, etc.)?	☐	☐	☐	☐	☐	☐
Have you posted mean or embarrassing messages or spread rumours about anyone on the Internet (Facebook, YouTube, etc.)?	☐	☐	☐	☐	☐	☐
Have you posted mean or embarrassing pictures or videos of anyone on the Internet (Facebook, YouTube, etc.)?	☐	☐	☐	☐	☐	☐